

UNCLASSIFIED

AD NUMBER	
AD007966	
CLASSIFICATION CHANGES	
TO:	unclassified
FROM:	confidential
LIMITATION CHANGES	
TO: Approved for public release; distribution is unlimited.	
FROM: Controlling DoD Organization: Bureau of Ordnance, Department of the Navy, Washington, DC 20350.	
AUTHORITY	
28 Feb 1965, DoDD 5200.10; NSWC ltr dtd 4 Mar 1976	

THIS PAGE IS UNCLASSIFIED

UNCLASSIFIED

AD _____

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION ALEXANDRIA, VIRGINIA

DOWNGRADED AT 3 YEAR INTERVALS:
DECLASSIFIED AFTER 12 YEARS
DCD DIR 5200.10



UNCLASSIFIED

THIS REPORT HAS BEEN DECLASSIFIED
AND CLEARED FOR PUBLIC RELEASE.

DISTRIBUTION A
APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

AD No. 7966
ASTIA FILE COPY

CONFIDENTIAL
SECURITY INFORMATION

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO. 1094

PROJECTILES AND WARHEAD FRAGMENTATION

24th Partial Report

TESTS OF
ENERGA ANTI-TANK RIFLE GRENADES

FINAL Report

Copy No. 12

Task

Assignment NP6-Re2c-35-1-53

Classification CONFIDENTIAL
SECURITY INFORMATION

1953 MAR 4 AM 9 08
JAN 1953

CONFIDENTIAL

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Energa Anti-Tank Rifle Grenades

PART A

SYNOPSIS

1. This test was conducted to determine lethal ranges of the nose, beam, and base fragments of the Energa anti-tank rifle grenade.
2. The maximum range for penetration of 0.040 dural by a fragment from a statically detonated Energa grenade is between 275 feet and 300 feet for the nose fragments, between 15 feet and 20 feet for the beam spray fragments, and between 20 feet and 30 feet for the base fragments.

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Energa Anti-Tank Rifle Grenades

TABLE OF CONTENTS

	<u>Page</u>
SYNOPSIS	1
TABLE OF CONTENTS.	2
AUTHORITY.	3
REFERENCES	3
BACKGROUND	3
OBJECT OF TEST	3
PERIOD OF TEST	3
DESCRIPTION OF ITEM UNDER TEST	4
PROCEDURE.	4
RESULTS AND DISCUSSION	4
CONCLUSIONS.	4
APPENDIX A - ENERGA ANTI-TANK RIFLE GRENADES . . .FIGURES 1-2 (Incl)	
APPENDIX B - FRAGMENT PENETRATION DATATABLE I	
APPENDIX C - DISTRIBUTION.	1-2 (Incl)

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Energa Anti-Tank Rifle Grenades

PART B

INTRODUCTION

1. AUTHORITY:

This test was authorized by reference (a) and conducted under Task Assignment NPG-Re2c-35-1-53, reference (b).

2. REFERENCES:

- a. BUORD conf ltr S78-1(31) Re2c-JSM:rjb Ser 45688 of 6 October 1952
- b. BUORD conf ltr NP9 Re2c-JSM:rjb Ser 42665 of 29 July 1952
- c. Dept of the Army Technical Bulletin TB ORD 404 of 29 January 1951

3. BACKGROUND:

In association with the development of an aircraft launcher for the Energa anti-tank rifle grenade for the Marine Corps, the Bureau of Ordnance directed the Naval Proving Ground to conduct tests to determine the safety of airborne aircraft against the fragments of the grenade.

4. OBJECT OF TEST:

This test was conducted to determine the lethal fragment range of the nose, beam, and base fragments of the Energa anti-tank rifle grenade.

5. PERIOD OF TEST:

- | | |
|-------------------------------------|-----------------|
| a. Date Project Letter | 6 October 1952 |
| b. Date Necessary Material Received | 23 October 1952 |
| c. Date Commenced Test | 3 December 1952 |
| d. Date Completed Test | 4 December 1952 |

CONFIDENTIAL
SECURITY INFORMATION

Tests of Energa Anti-Tank Rifle Grenades
-----PART CDETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

The Energa anti-tank rifle grenade, HE, AT, T-41, is a fin stabilized, point initiated, base-detonated, shaped charge grenade containing 0.73 lbs. of RDX and TNT and weighing a total of 1.42 lbs. Three (3) fuzing systems, contractors drawing numbers 20001, 2000g, and 2000f₁, were used in this test. Fuze assembly drawings are shown in Figures 1 and 2.

7. PROCEDURE:

Each grenade was set in a horizontal position on a 4' high wooden stand. Dural plates, 0.040 thick, were placed at varying distances from the grenade to catch the nose (or jet) fragments (0°), the beam spray (90°) fragments and the base (180°) fragments. These plates (4' x 12') were placed sometimes horizontally and sometimes vertically and were moved to various distances until the limits of fragment penetration were obtained.

8. RESULTS AND DISCUSSION:

Twenty-eight (28) rounds of Energa anti-tank rifle grenades, HE, AT, T-41, were statically detonated to determine the maximum lethal range and minimum safety distance against 0.040 dural aluminum plate. Detailed penetration data are given in Table I. Some fragment penetrations were obtained from the nose (0°) spray at 275 feet distance, from the beam (90°) spray at 15 feet, and from the base (180°) spray at 20 feet. No penetrations were observed at 300 feet from the nose, at 20 feet from the beam, or at 30 feet from the base. Variations of the fuzing system did not affect the fragment penetration results.

PART DCONCLUSIONS

9. The maximum range for penetration of 0.040 dural by a fragment from a statically detonated Energa grenade is between 275 feet and 300 feet for the nose fragments, between 15 feet and 20 feet for the beam spray fragments, and between 20 feet and 30 feet for the base fragments.

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Energa Anti-Tank Rifle Grenades

The tests upon which this report is based were conducted by:

W. WRIGHT, JR, Fragmentation Firing Officer
Fragmentation Division
Terminal Ballistics Department

This report was prepared by:

W. WRIGHT, JR, Fragmentation Firing Officer
Fragmentation Division
Terminal Ballistics Department

This report was reviewed by:

V. PHILIPCHUK, Fragmentation Battery Officer
Fragmentation Division
Terminal Ballistics Department

R. H. LYDDANE, Director of Research
Terminal Ballistics Department

E. L. LEVSTIK, Lieutenant Commander, USNR
Terminal Ballistics Batteries Officer
Terminal Ballistics Department

W. B. ROBERTSON, Lieutenant Commander, USN
Terminal Ballistics Officer
Terminal Ballistics Department

C. C. BRAMBLE, Director of Research, Ordnance Group

APPROVED: J. F. BYRNE
Captain, USN
Commander, Naval Proving Ground



E. A. RUCKNER
Captain, USN
Ordnance Officer
By direction

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1094

**U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA**

**Twenty-fourth Partial Report
on
Projectiles and Warhead Fragmentation**

**Final Report
on
Tests of Energa Anti-Tank Rifle Grenades**

**Project No.: NPG-Re2c-35-1-53
Copy No.: 12
No. of Pages: 5**

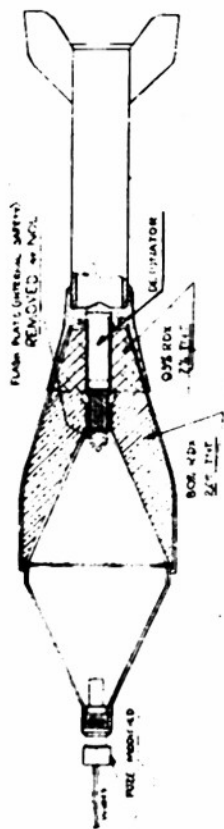
Date:

FEB 28 1953

**CONFIDENTIAL
SECURITY INFORMATION**

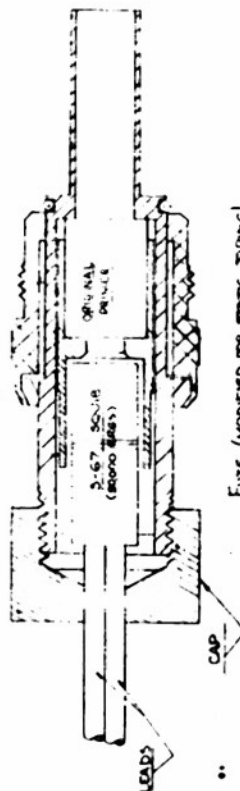
[illegible]

5K.555083



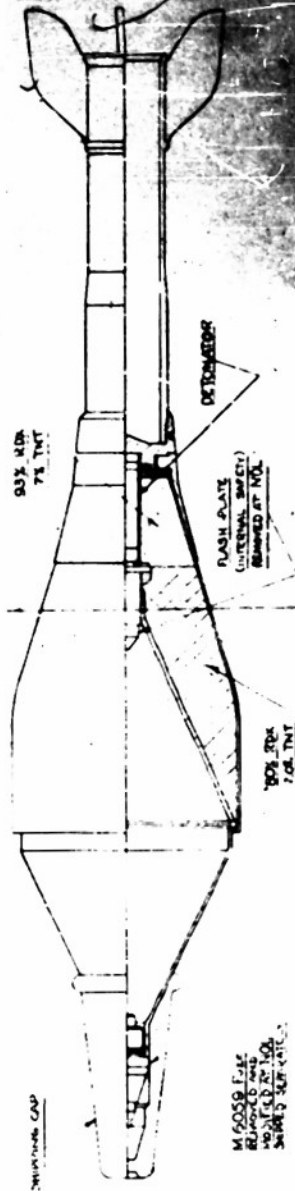
ENERGA GRENADE 2000f₁
FRAGMENTATION TEST

FRAGMENTATION TEST



Fuze (MODIFIED FOR STATIC FIRING)
GRENADE 2.000f.

ARMAS ANTES
ENERGIA GRENADE
2000E

[illegible]

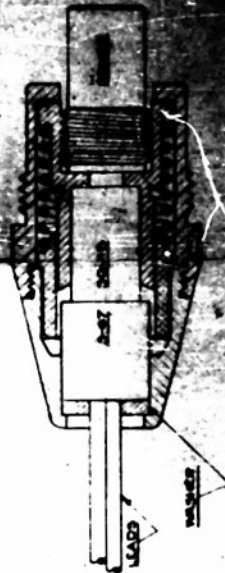
260157-701120

FLASH PLATE
(INTERNAL SAFETY)
REMOVED AT MOL

BOY - 20x
? of TNT

EVERETT GRENAD. 2000:

M 6059 Full
 B 10000 new
 M 6059 Full
 B 10000 new



WYDZ

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Emerga Anti-Tank Rifle Grenades

TABLE I

FRAGMENT PENETRATION DATA

Plate: OXO40 Dural

Plate Height: 12' nose, 4' beam, 4' base

Plate Width: 8' nose, 12' beam, 12' base

Fuze	Nose (0°)		Beam (90°)		Base (180°)	
	Distance (feet)	No. Pene- tration	Distance (feet)	No. Pene- tration	Distance (feet)	No. Pene- tration
2000f ₁	* 50	3	15	0	10	2
"	* 30	30	10	10	15	2
"	* 40	35	15	2	15	2
"	* 60	--	15	2	** 30	0
"	- 60	7	15	1	** 40	0
"	- 80	10	15	2	40	0
"	- 100	8	15	0	40	0
"	100	12	15	3	30	0
"	100	9	15	3	30	0
"	100	30	10	28	30	0
"	200	7	10	30	30	0
"	200	7	10	30	30	0
"	300	0	20	0	30	0
"	300	0	20	0	30	0
"	300	0	20	0	20	1
"	300	0	20	0	20	0
"	300	0	20	0	20	0
"	275	0	20	0	20	0
"	275	2	20	0	20	0
"	275	1	20	0	20	2
"	275	1	20	0	20	0
"	275	1	20	0	20	0
2000g	275	1	15	1	15	9
2000i	275	0	15	1	15	5
2000g	300	0	20	0	20	0
2000i	300	0	20	0	20	0
2000g	300	0	20	0	20	0
2000i	300	0	20	0	20	0

* nose plate 12' wide by 4' high

- nose plate 12' high by 4' wide

** base plate 12' high by 4' wide

CONFIDENTIAL
SECURITY INFORMATION

APPENDIX B

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Eneerg Anti-Tank Rifle Grenades

DISTRIBUTION

Bureau of Ordnance:

Ad3	1
Re2	1
Re3	2
Re2c	5

Chief of Ordnance Department of the Army Attn: ORDTX-AR	1
---	---

Navy Research Section Library of Congress Washington 25, D. C. (71a BUORD Re2)	2
---	---

Commanding General Aberdeen Proving Ground Aberdeen, Maryland Attn: Technical Information Section Development and Proof Services	1
--	---

Commander, Operational Development Force U. S. Atlantic Fleet, U. S. Naval Base Norfolk 11, Virginia	1
--	---

Naval Ordnance Laboratory	1
---------------------------	---

Naval Ordnance Laboratory Attn: Explosives Division	1
Attn: Mr. H. W. Semon	1

Picatinny Arsenal, Dover, N. J. Attn: Technical Division	1
---	---

Reports Office APL/JHU, Silver Spring, Maryland	1
--	---

USNOTS, Inyokern, China Lake, Calif.	1
--------------------------------------	---

CONFIDENTIAL

SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1094

Tests of Energa Anti-Tank Rifle Grenades

DISTRIBUTION (Continued)

Inst. for Cooperative Research
JHU/1315 St. Paul St.
Via: (District Chief, Phila. Ord District
1500 Chestnut St., Phila. 2, Pa.
Attn: Mr. Edward R. C. Niles)

1

Commandant of the Marine Corps
Headquarters, USMC
Washington 25, D. C.

2

President, Marine Corps Equipment Board
Quantico, Virginia

2

Local:

OT
OTZ
OT-1
File

1
1
1
1